UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/550,649	04/17/2000	Jarod Guertin	10,0029	1375

22474 7590 10/29/2007
CLEMENTS WALKER
1901 ROXBOROUGH ROAD
SUITE 300
CHARLOTTE, NC 28211

EXAMINER	
KIM, DAVID S	

ART UNIT	PAPER NUMBER
2613	

MAIL DATE	DELIVERY MODE
10/29/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	09/550,649	GUERTIN ET AL.
	Examiner	Art Unit
	David S. Kim	2613

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 27 August 2007.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-22 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. **Claims 1, 5, and 9** are objected to because of the following informalities:

Notice the following limitation in independent claims 1, 5, and 9, near the end of each claim:

(claim 1) "wherein the bit error rate test signal is operable to simultaneously test the N optical communication channels from the single bit error rate test source in conjunction with ***the*** performance monitor in each of the optical transmitters and each of the optical receivers and the diagnostic analyzer" (emphasis Examiner's).

(claim 5) "wherein the bit error rate test signal is operable to simultaneously test the plurality of optical communication channels from the single bit error rate test source in conjunction with ***the*** performance monitor in each of the optical transmitters and each of the optical receivers and the diagnostic analyzer" (emphasis Examiner's).

(claim 9) "wherein said tester comprises a single bit error rate source operable to simultaneously test the plurality of optical communication channels in conjunction with ***the*** performance monitor in each of the optical transmitters and each of the optical receivers and the diagnostic analyzer" (emphasis Examiner's).

This emphasized limitations above discloses simultaneous testing of optical communication channels in conjunction with ***one*** performance monitor and the diagnostic analyzer. However, Fig. 2 clearly shows simultaneous testing of optical communication channels in conjunction with ***each*** performance monitor of the plurality of performance monitors and the diagnostic analyzer. As a remedy, Examiner respectfully suggests Applicant to amend the limitations above to "***each*** performance monitor".

Also, notice the following limitation in **claim 5**:

"wherein the faulty communication channel is identified ***without*** responsive to simultaneous testing of the optical transmitters and the optical receivers" (emphasis Examiner's).

Examiner respectfully notes that the following may have been intended in view of Applicant's comments filed on 27 August 2007 (REMARKS, p. 10-11, bridging paragraph):

"wherein the faulty communication channel is identified ~~***without***~~ responsive to simultaneous testing of the optical transmitters and the optical receivers" (emphasis Examiner's).

Also, notice the following limitation in **claim 9**:

"a diagnostic analyzer to analyze ***diagnostic output signals*** from said transmitters and said receivers...wherein the ***diagnostic output*** are generated by the performance monitor" (emphasis Examiner's).

Examiner respectfully notes that the following may have been intended:

"a diagnostic analyzer to analyze ***diagnostic output signals*** from said transmitters and said receivers...wherein the ***diagnostic output signals*** are generated by the performance monitors" (emphasis Examiner's).

Otherwise, antecedent basis would be lacking for "diagnostic output". Also, Fig. 2 clearly shows that the diagnostic output signals from the transmitters and receivers are generated by more than one performance monitor.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. Applicant's response to the rejections of the claims under 35 U.S.C. 112 in the previous Office Action (mailed on 27 April 2007) is noted and appreciated. Applicant responded by amending the claims. Applicant's response overcomes the previous rejections under 35 U.S.C. 112, which are presently withdrawn.

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. **Claims 1-22** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In particular, notice the following limitations in independent claims 1, 5, and 9:

(claim 1) "identifying, with a diagnostics analyzer that analyzes a plurality of transmitter diagnostic output signals from each optical transmitter and a plurality of receiver diagnostic output signals from each optical receiver, which of the N optical communication channels has an associated bit error rate value that is greater than a specified bit error rate value, and thus is a faulty communication channel that needs correction, wherein ***the plurality*** of transmitter diagnostic output ***signals*** and ***the plurality*** of receiver diagnostic output ***signals each*** are generated by ***each*** performance monitor" (emphasis Examiner's).

(claim 5) "identifying, with a diagnostics analyzer that analyzes a plurality of transmitter diagnostic output signals from each optical transmitter and a plurality of receiver diagnostic output signals from each optical receiver, at least one faulty communication channel from said plurality of optical communication channels in the wavelength division optical communication system by performing a bit parity check for each transmitter/receiver pair because the measured bit error rate is greater than a predetermined system bit error rate threshold, wherein ***the plurality*** of transmitter diagnostic output signals and ***the plurality*** of receiver diagnostic output ***signals each*** are generated by ***each*** performance monitor" (emphasis Examiner's).

(claim 9) "a diagnostic analyzer to analyze diagnostic output signals from said transmitters and said receivers and to identify at least one faulty communication channel from said optical transmitter/receiver pairs using a bit parity check because said measured bit error rate is greater than said predetermined bit error rate threshold, wherein the ***diagnostic output are*** generated by the ***performance monitor***" (emphasis Examiner's).

In these claim limitations, ***one*** performance monitor generates ***two*** types of diagnostic output signals, i.e., a transmitter diagnostic output signal and a receiver diagnostic output signal. However, Fig. 2 clearly shows that ***each*** transmitter diagnostic output signal (225) is generated by its own respective ***transmitter*** performance monitor and that ***each*** receiver diagnostic output signal (235) is generated by its own respective receiver performance monitor. Accordingly, these claim limitations disclose ***new matter***.

As a remedy, Examiner respectfully suggest the following claim language:

(claim 1) "identifying, with a diagnostics analyzer that analyzes a plurality of transmitter diagnostic output signals from each optical transmitter and a plurality of receiver diagnostic output signals from each optical receiver, which of the N optical communication channels has an associated bit error rate value that is greater than a specified bit error rate value, and thus is a faulty communication channel that needs correction, wherein each diagnostic output signal of the plurality of transmitter diagnostic output signals and the plurality of receiver diagnostic output signals ~~each are~~ is generated by ~~each~~ its own respective performance monitor" (emphasis Examiner's).

(claim 5) "identifying, with a diagnostics analyzer that analyzes a plurality of transmitter diagnostic output signals from each optical transmitter and a plurality of receiver diagnostic output signals from each optical receiver, at least one faulty communication channel from said plurality of optical communication channels in the wavelength division optical communication system by performing a bit parity check for each transmitter/receiver pair because the measured bit error rate is greater than a predetermined system bit error rate threshold, wherein the each diagnostic output signal of plurality of transmitter diagnostic output signals and the plurality of receiver diagnostic output signals ~~each are~~ is generated by ~~each~~ its own respective performance monitor" (emphasis Examiner's).

(claim 9) "a diagnostic analyzer to analyze diagnostic output signals from said transmitters and said receivers and to identify at least one faulty communication channel from said optical transmitter/receiver pairs using a bit parity check because said measured bit error rate is greater than said predetermined bit error rate threshold, wherein ~~the~~ each diagnostic output signal ~~are~~ is generated by ~~the~~ its own respective performance monitor" (emphasis Examiner's).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Juniper

7. **Claims 1-2, 12-14, and 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Juniper ("Juniper Networks M40 Internet Backbone Router Inter-operating with the CIENA MultiWave Sentry DWDM System") in view of the admitted prior art (hereinafter "the APA"), Waschka, Jr. (U.S. Patent No. 4,449,247), Bach et al. (U.S. Patent No. 6,606,354 B1, hereinafter "Bach"), Bergano et al. ("Margin measurements in optical amplifier systems", hereinafter "Bergano") and Hoogerbrugge ("Optimizing test strategies for SONET/SDH/ATM network element manufacturing").

Regarding claim 1, Juniper discloses:

A method of testing a bit error rate for each of a plurality (*N*) of (multiple spans in Fig. 9) optical communication channels, *N* being greater than 2, in a wavelength division multiplexed optical communication system (the Sentry DWDM system is a WDM system) having *N* optical transmitters (transmitter modules in Sentry 1600, not shown) communicating to *N* optical receivers (receiver modules in Sentry 1600, not shown) via *N* communication channels, the *N* optical receivers being co-located (co-location in a Sentry module in Fig. 9) with each other and with the *N* optical transmitters for testing the method comprising:

cascading (concatenated spans in Fig. 9) said *N* optical communication channels such that an electrical (implied by the use of SONET signals, which are electrical after reception by receivers and electrical before transmission by transmitters) output of an optical receiver *i* for an optical communication channel *i* is connected to an input of an optical transmitter *i+1* for an optical communication channel *i+1*, for all values of *i* from one to *N-1*, so as to form a continuous cascade of a co-located plurality of optical transmitter/receiver pairs (cascaded transmitter/receiver pairs implied in Fig. 9);

supplying (signal from BERT on p. 8) a bit error rate test signal from a bit error rate tester (BERT on p. 8) to an input for a first optical transmitter for a first optical communication channel;

supplying (implied by return of BERT test signal from concatenated spans to BERT unit on p. 8) the bit error rate test signal from an output of optical receiver *N* to the bit error rate tester<u>; and</u>

<u>wherein the bit error rate test signal is provided from a single bit error rate test source (the single BERT on p. 8).</u>

Juniper does not expressly disclose:

detecting errors in the bit error rate test signal received by the bit error rate tester and calculating therefrom a measured system bit error rate.

However, such detecting is the general purpose of BERT units, such as in the one mentioned on p. 8 of Juniper. Although the system in the method of Juniper was tested as error free, if the system were further lengthened so that the errors would start to appear, then the BERT of Juniper would detect such errors. At the time the invention was made, it would have been obvious to one of ordinary skill in the art to further lengthen the transmission distance or to further increase the number of spans of Juniper. One of ordinary skill in the art would have been motivated to do this for the common purpose of finding out the transmission limits of the system, such limits being correlated to detected errors.

Juniper also does not expressly disclose:

comparing the measured system bit error rate with a predetermined system bit error rate threshold;

monitoring a signal quality for the bit error rate test signal at each of the *N* optical transmitters and each of the *N* optical receivers in the wavelength division multiplexed optical communication system when the measured system bit error rate is greater than the predetermined system bit error rate threshold to thereby determine which of the *N* optical communication channels has an associated bit error rate value that is greater/less than a specified bit error rate value, <u>wherein the monitoring a signal quality is associated with</u> a performance monitor in each of the optical transmitters and each of the optical receivers in the continuous cascade of a co-located plurality of optical transmitter/receiver pairs; and

identifying, with a diagnostics analyzer that analyzes a plurality of transmitter diagnostic output signals from each optical transmitter and a plurality of receiver diagnostic output signals from each optical receiver, which of the N optical communication channels has an associated bit error rate value that is greater than a specified bit error rate value, and thus is a faulty communication channel that needs correction<u>, wherein the plurality of transmitter diagnostic signals and the plurality of receiver diagnostic output signals are generated by the performance monitors; and</u>

<u>wherein the bit error rate test signal is operable to test the N optical communication channels from the single bit error rate test source in conjunction with the performance monitors and the diagnostic analyzer.</u>

However, Waschka, Jr. discloses such comparing (col. 31, lines 3-4) and monitoring (col. 19, lines 30-59, col. 31, lines 5-21; note sequence detectors 57 and 61 in Figs. 4 and 7, col. 9, lines 42-50, col. 17, lines 14-38) as part of a fault location technique (col. 19, lines 30-59) that employs performance monitors (BER circuitry in each station, col. 19, l. 30-33). This fault location technique of Waschka, Jr. also includes a step of identifying a faulty communication channel (col. 5, l. 40-42, col. 31, l. 19-21) with a diagnostics analyzer (alarm units in Figs. 10-11; diagnostic output signals in col. 3, l. 30-45; col. 19, l. 30-40 <u>generated by the performance monitors of the BER circuitry in col. 19, l. 30-33</u>) that is similar to Applicant's step of identifying. <u>This fault location technique of Waschka, Jr. also includes a bit error rate test signal ("BER test sequence" in col. 19, l. 20-21) that is operable to test N communication channels</u>

(links between stations in Fig. 1) from a single bit error rate test source (BER test unit 22 in Fig. 2) in conjunction with the performance monitors (BER circuitry in each station, col. 19, l. 30-33) and the diagnostic analyzer (alarm units in Figs. 10-11). Although Juniper is silent about fault location, the APA teaches fault location for WDM optical communication systems. At the time the invention was made, it would have been obvious to one of ordinary skill in the art to implement at least some fault location teachings in the method of Juniper. One of ordinary skill in the art would have been motivated to do this since Juniper is silent about fault location and the APA teaches that fault location for WDM optical communication systems enables the common benefit of troubleshooting and repairing equipment related to located faults (Applicant's specification, p. 3, 2nd full paragraph), thus improving the quality and maintenance of the system.

Accordingly, at the time the invention was made, it would have also been obvious to one of ordinary skill in the art to further employ the fault location teachings of Waschka, Jr. in the method of Juniper in view of the APA. One of ordinary skill in the art would have been motivated to do this since, although the APA teaches that fault location may be desirable, Juniper is silent about the technical details of any particular fault location technique. Waschka, Jr. speaks into that silence by providing a fault location technique. Note that the fault location teachings of Waschka, Jr. may be suitable for the method of Juniper due to the similarities of the systems of Waschka, Jr. and Juniper, such as: BER testing units (Juniper, BERT on p. 8; Waschka, Jr., bit error rate test unit 22 in Fig. 8), cascaded optical communication channels (Juniper, concatenated spans in Fig. 9; Waschka, Jr., cascaded channel links in Fig. 1, col. 19, lines 25-28), and optical transmitter/receiver pairs (Juniper, transmitter/receiver pairs implied in Fig. 9; Waschka, Jr., Figs. 2-4, optical transceivers).

Juniper in view of the APA and Waschka, Jr. does not expressly disclose:

the diagnostic analyzer analyzing a plurality of *transmitter diagnostic output signals* ***from each optical transmitter*** and a plurality of *receiver diagnostic output signals* ***from each optical receiver***, wherein the plurality of transmitter diagnostic output signals and the plurality of receiver diagnostic output signals ***each*** are generated by ***each*** performance monitor; and

wherein the bit error rate test signal is operable to test the N optical communication channels from the single bit error rate test source in conjunction with the performance monitor in ***each*** of the optical transmitters and ***each*** of the optical receivers and the diagnostic analyzer (emphasis Examiner's).

Rather, the diagnostic analyzer of Juniper in view of the APA and Waschka, Jr. analyzes a plurality of diagnostic output signals (col. 3, l. 30-45; col. 19, l. 30-40), each diagnostic output signal being from a performance monitor (BER circuitry in each station, col. 19, l. 30-33) in each transmitter/receiver pair (stations in Fig.1). Although the diagnostic output signals of Waschka, Jr. are not from a performance monitor in *each* transmitter and receiver, modifying the apparatus of Waschka, Jr. to do so is obvious. That is, consider the basic technique of decentralizing a singular process from one location to multiple locations. At the time the invention was made, it would have been obvious to one of ordinary skill in the art to decentralize the fault location process from a transmitter/receiver pair in Waschka, Jr. to other locations, such as each transmitter and each receiver. One of ordinary skill in the art would have been motivated to do this for at least one common motivation for decentralizing a singular process from one location to multiple locations, such as increasing the granularity of fault detection and location. That is, increasing the number of locations for fault detection and location leads to more precise fault location.

Juniper in view of the APA and Waschka, Jr. does not expressly disclose:

wherein each performance monitor comprises an optical-to-electrical converter, a signal conditioning unit, an analog-to-digital converter, a microprocessor, a clock and data recovery unit, a decision circuit, and an error monitoring unit, and wherein each performance monitor actively monitors bit errors.

However, such components in a performance monitor are common. Bach shows an example of such components in a performance monitor (Fig. 2, an optical-to-electrical converter 1, a signal conditioning unit 2, an analog-to-digital converter 9, a microprocessor 13, a clock and data recovery unit (i.e., units that provide clock and data to unit 6), a decision circuit 8 or 10, and an error monitoring unit 12) that actively monitors bit errors (notice all of the active circuitry in Bach). At the time the invention

was made, it would have been obvious to one of ordinary skill in the art to incorporate the performance monitor teachings of Bach to augment the performance monitor teachings of Juniper in view of the APA and Waschka, Jr. One of ordinary skill in the art would have been motivated to do this to provide signal quality information in a short period of time (Bach, "few seconds" in col. 1, l. 61).

Juniper in view of the APA, Waschka, Jr., and Bach does not expressly disclose:

wherein each performance monitor actively monitors Q by adjusting a decision level threshold provided by the microprocessor.

However, Q is well known measure of signal quality/merit in optical transmission systems, as discussed by Bergano (p. 304, col. 1, "signal-to-noise ratio (SNR)...is a natural figure of merit" in the middle paragraph, "Q is the signal-to-noise ratio at the decision circuit in voltage or current units" in the last paragraph). Also, monitoring Q by adjusting a decision level threshold is also a known technique, as shown by Bergano (p. 304-305, section III, adjustment of decision level in Fig. 1). At the time the invention was made, it would have been obvious to one of ordinary skill in the art to arrange each performance monitor to also actively monitor Q in this fashion. One of ordinary skill in the art would have been motivated to do this to provide a measure of signal quality when the BER is too low to be measured in a reasonable time (Bergano, abstract), when the BER is too small to be directly measured (Bergano, p. 304, col. 1, middle paragraph), or when it is impractical to measure the BER (Bergano, p. 305, col. 2, last paragraph). Moreover, a processor is generally known to be a suitable location to store values used for comparison and/or calculations, such as the decision level threshold. Thus, an obvious variation of the method of the prior art of record would be to arrange the microprocessor (Bach, 13 in Fig. 2) to provide the decision level threshold.

Juniper in view of the APA and Waschka, Jr. does not expressly disclose:

wherein the faulty communication channel is identified responsive to simultaneous testing of the optical transmitters and the optical receivers; and

wherein the bit error rate test signal is operable to ***simultaneously*** test the N optical communication channels from the single bit error rate test source in conjunction with the performance monitor in each of the optical transmitters and each of the optical receivers and the diagnostic analyzer (emphasis Examiner's).

However, Hoogerbrugge teaches that other types of channel testing are suitable in a testing environment (p. 977, col. 1, 2nd to last paragraph), e.g., simultaneously or in parallel. At the time the invention was made, it would have been obvious to one of ordinary skill in the art to employ any of these other types of channel testing. One of ordinary skill in the art would have been motivated to do this to provide design flexibility.

Regarding claim 2, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, and Hoogerbrugge discloses:

The method of claim 1, wherein said predetermined system bit error rate is equal to the specified bit error rate for each of *N* optical communication channels (Waschka, Jr. teaches the same error rate for a system BER and a channel-specific BER, see "prescribed level" in claims 11-12).

Regarding claim 12, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, and Hoogerbrugge discloses:

The method of claim 1, wherein said monitoring monitors a received signal quality (Waschka, Jr., col. 19, lines 30-59, col. 31, lines 5-21) for the bit error rate test signal (Waschka, Jr., "test sequence" and "test signal") supplied by the bit error rate tester, as the bit error rate test signal is propagating from the input for the first optical transmitter to the output of the optical receiver *N*.

Regarding claim 13, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, and Hoogerbrugge does not expressly disclose:

The method of claim 1, further comprising:

indicating that a bit error rate for each of the *N* optical communication channels is less than a specified bit error rate value when the measured bit error rate is less than or equal to the predetermined system bit error rate threshold.

However, Waschka, Jr. does disclose providing a BER indication for each of the channels when the measured system BER is unacceptable (Waschka, Jr., col. 19, lines 30-42). In the case that the measured system BER is acceptable (the measured bit error rate is less than or equal to the predetermined system bit error threshold), it would be obvious to a person of ordinary skill in the art to set the BER of each of the communication channels to be less than a specified BER, that is, the predetermined system bit error rate threshold. One of ordinary skill in the art would have been motivated to do this in order to keep the system BER less than the predetermined system bit error rate threshold. More exactly, the system BER is the cumulative sum of the channel BER values. Thus, if the BER of each communication channel were less than the predetermined system bit error rate threshold, the system BER would be less than that same threshold. Accordingly, at the time the invention was made, it would have been obvious to a person of ordinary skill in the art to also include said indicating. One of ordinary skill in the art would have been motivated to do this to show the status of the communication channels, informing maintenance personnel of the BER status of the communication channels (Waschka, Jr., col. 5, lines 22-27).

Regarding claim 14, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, and Hoogerbrugge discloses:

The method of claim 1, wherein the monitoring of the bit error rate test signal is performed at an input (Waschka, Jr., note sequence detectors 57 and 61 in Figs. 4 and 7, col. 9, lines 42-50, col. 17, lines 14-38) of each of the *N* optical transmitters and *N* optical receivers.

Regarding claim 20, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, and Hoogerbrugge discloses:

The method of claim 1, wherein the optical transmitters and receivers for the *N* optical communication channels are co-located (Juniper, co-location in a Sentry module in Fig. 9; Waschka, Jr., Figs. 2-4, optical transceivers).

8. **Claims 3-11, 15-19, and 21-22** are rejected under 35 U.S.C. 103(a) as being unpatentable over Juniper in view of the APA, Waschka, Jr., Bach, Bergano, and Hoogerbrugge as applied to claim 1 above, and further in view of Bullock et al. (U.S. Patent No. 5,764,651, hereinafter "Bullock").

Regarding claim 3, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, and Hoogerbrugge does not expressly disclose:

The method of claim 1, wherein said monitoring said signal quality includes a bit parity check.

Bullock teaches a method of testing a bit error rate for optical communication systems that includes a bit parity check (Bullock, col. 1, l. 57-67). This method is a part of a common and extremely well known communications network standard, SONET (Bullock, col. 1, l. 57). Juniper already employs SONET (Juniper, p. 3, 1st paragraph). Also, a bit parity check is known as a common technique for monitoring signal quality (BER), so a bit parity check would be an obvious method for one to employ in said monitoring of signal quality.

Regarding claim 4, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, Hoogerbrugge, and Bullock discloses:

The method of claim 1, wherein said monitoring includes monitoring a bit interleave parity (Bullock, col. 1, l. 57-67) for said bit parity check on each electrical signal in the *N* optical transmitter/receiver pairs.

Regarding claim 5, claim 5 is a method claim that corresponds largely to the method claim 3. Therefore, the recited steps in method claim 3 read on the corresponding steps in method claim 5. Claim 5 also includes limitations absent from claim 3. Juniper in view of the APA, Waschka, Jr., Bach, Bergano, Hoogerbrugge, and Bullock also discloses these limitations:

the transmitters being co-located with each other and with the receivers for testing (Juniper, co-location in Sentry module(s) in Fig. 9);

co-located plurality of optical transmitter/receiver pairs (Juniper, co-location in Sentry module(s) in Fig. 9); and

identifying at least one faulty communication channel from said plurality of optical communication channels (Waschka, Jr., col. 5, lines 45-49) by performing a bit parity check (Bullock, col. 1, l. 57-67) for each transmitter/receiver pair (Waschka, Jr., note that the test signal is input into each transmitter and each receiver, col. 5, lines 28-49, col. 19, lines 13-42) because the measured bit error rate

(Waschka, Jr., col. 31, lines 3-4) is greater than a predetermined system bit error rate threshold (Waschka, Jr., col. 31, line 4).

Regarding claim 6, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, Hoogerbrugge, and Bullock discloses:

The method of claim 5, further comprising monitoring (Waschka, Jr., col. 19, lines 30-59, col. 31, lines 5-21) a signal quality for the at least one faulty communication channel using an internal performance monitor (Waschka, Jr., BER test circuitry in each station, col. 19, lines 30-33).

Regarding claim 7, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, Hoogerbrugge, and Bullock discloses:

The method of claim 6, wherein said internal performance monitor checks a signal transmitted through the at least one faulty communication channel (Waschka, Jr., col. 19, lines 25-42).

Regarding claim 8, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, Hoogerbrugge, and Bullock discloses:

The method of claim 5, further comprising passing said bit error rate test signal through said plurality of optical communication channels (Juniper, concatenated spans in Fig. 9; Waschka, Jr., channel links between stations, col. 19, lines 18-30).

Regarding claim 9, claim 9 is a system claim that corresponds largely to the method claim 3. Therefore, the recited steps in method claim 3 read on the corresponding means in system claim 9. Claim 9 also includes limitations absent from claim 3. Juniper in view of the APA, Waschka, Jr., Bach, Bergano, Hoogerbrugge, and Bullock also discloses these limitations:

the transmitters being co-located with each other and with the receivers for testing (Juniper, co-location in Sentry module(s) in Fig. 9);

a co-located plurality of transmitter/receiver pairs (Juniper, co-location in Sentry module(s) in Fig. 9); and

a diagnostic analyzer (Waschka, Jr., alarm units in Figs. 10-11) to analyze diagnostic output signals (Waschka, Jr., col. 5, lines 31-49) from said transmitters and said receivers and to identify (Waschka, Jr., col. 5, lines 40-42, col. 31, lines 19-21) at least one faulty communication channel from said

optical transmitter/receiver pairs using a bit parity check (Bullock, col. 1, l. 57-67) because said measured bit error rate (Waschka, Jr., col. 31, lines 3-4) is greater than said predetermined bit error rate threshold (Waschka, Jr., col. 31, line 4).

Regarding claim 10, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, Hoogerbrugge, and Bullock discloses:

The system of claim 9, further comprising an internal performance monitor (Waschka, Jr., BER test circuitry in each station, col. 19, lines 30-33) coupled to said diagnostic analyzer.

Regarding claim 11, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, Hoogerbrugge, and Bullock discloses:

The system of claim 10, wherein said internal performance monitor comprises an error monitoring unit (Waschka, Jr., Fig. 7, col. 15, line 64 – col. 16, line 4).

Regarding claim 15, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, Hoogerbrugge, and Bullock discloses:

The method of claim 5, wherein the plurality of optical communication channels include three or more optical communication channels that are cascaded (Juniper, up to 24 concatenated spans in Fig. 9; Waschka, Jr., note each link between each pair of stations in Fig. 1).

Regarding claim 16, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, Hoogerbrugge, and Bullock discloses:

The method of claim 5, wherein the identifying at least one faulty communication channel monitors (Waschka, Jr., col. 19, lines 30-59, col. 30, lines 61-68, col. 31, lines 5-21) the signal quality of the bit error rate signal (Waschka, Jr., col. 9, line 63 – col. 10, line 3, col. 30, lines 61-68, col. 31, lines 3-21), as the bit error rate test signal is propagating from the input for the first optical transmitter through the continuous cascade of transmitter/receiver pairs.

Regarding claim 17, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, Hoogerbrugge, and Bullock discloses:

The system of claim 9, wherein the plurality of optical communication channels include three or more optical communication channels that are cascaded (Juniper, up to 24 concatenated spans in Fig. 9; Waschka, Jr., note each link between each pair of stations in Fig. 1).

Regarding claim 18, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, Hoogerbrugge, and Bullock discloses:

The system of claim 9, wherein the diagnostic analyzer is configured to analyze the diagnostic output signals (Waschka, Jr., col. 5, lines 31-49) from said transmitters and receivers in response to monitoring (Waschka, Jr., col. 19, lines 30-59, col. 30, lines 61-68, col. 31, lines 3-21) a signal quality of the bit error rate signal (Waschka, Jr., col. 9, line 63 – col. 10, line 3, col. 30, lines 61-68, col. 31, lines 3-21) input to each of said transmitters and said receivers (Waschka, Jr., note that the test signal is input into each transmitter and each receiver, col. 5, lines 28-49, col. 19, lines 13-42).

Regarding claim 19, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, Hoogerbrugge, and Bullock discloses:

The system of claim 18, wherein each of said transmitters and said receivers (Waschka, Jr., note sequence detectors 57 and 61 in Figs. 4 and 7, col. 9, lines 42-50, col. 17, lines 14-38; note that the test signal is input into each transmitter and each receiver, col. 5, lines 28-49, col. 19, lines 13-42) is configured to monitor the signal quality of the bit error rate signal supplied by the bit error rate tester, as the bit error rate test signal is propagating from the input of the first optical transmitter to the final optical receiver.

Regarding claim 21, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, Hoogerbrugge, and Bullock discloses:

The method of claim 5, wherein the plurality of optical communication channels are arranged in the continuous cascade by connecting electrical outputs of optical receivers to inputs of optical transmitters in the plurality of transmitter/receiver pairs (implied by the use of SONET signals, which are electrical after reception by receivers and electrical before transmission by transmitters).

Regarding claim 22, Juniper in view of the APA, Waschka, Jr., Bach, Bergano, Hoogerbrugge, and Bullock disclose:

The method of claim 9, wherein the plurality of optical communication channels are arranged in the continuous cascade by connecting electrical outputs of optical receivers to inputs of optical transmitters in the plurality of transmitter/receiver pairs (implied by the use of SONET signals, which are electrical after reception by receivers and electrical before transmission by transmitters).

Response to Arguments

9. Applicant's arguments filed on 27 August 2007 have been fully considered but they are not persuasive. Applicant states:

> "Applicants respectfully submit that the combination of Juniper, APA, Waschka Jr., Back et al., and Hoogerbrugge does not teach a performance monitor in each TX and RX that actively monitors bit errors and Q by adjusting a decision level threshold provided by the microprocessor. Additionally, the combination does not teach providing a bit error rate test signal from a single bit error rate test source with the bit error rate test signal operable to simultaneously test the N optical communication channels from the single bit error rate test source in conjunction with the performance monitor in each of the optical transmitters and each of the optical receivers and the diagnostics analyzer. Further, the combination does not teach that the performance monitor on each TX and RX generates transmitter diagnostic output signals and receiver diagnostic output signals. These signals are used by the diagnostics analyzer to determine which channels are faulty from the single BER test source. Applicants have amended independent Claim 1 to include these limitations to further clarify the present invention.
>
> Juniper teaches a multi-span interoperability test between an M40 router and a CIENA SENTRY multi-channel DWDM system. Juniper does not teach performance monitors in conjunction with a diagnostics analyzer to determine which channels are faulty. Juniper is concerned with overall system BER, not individual channel BER and Q. Juniper addresses interoperability between vendors, not a testing method for multiple channels with one source.
>
> Waschka, Jr. teaches a system in which an operator must selectively interrogate units along a fiber link and in which sequential testing is required. Bach et al. teaches determining BER and signal quality of an unknown input signal. There is no suggestion of using a single source for multiple signals with performance monitors in conjunction with a diagnostics analyzer. Hoogerbrugge simply mentions bum-in testing in parallel. Hoogerbrugge does not teach Applicants novel use of performance monitors per TX and RX in conjunction with the diagnostics analyzer to use a single BER source to identify per channel faults" (REMARKS, p. 12, middle paragraph – p. 13, 1st full paragraph, emphasis Applicant's).

Examiner respectfully notes that the standing rejections point out the portions of the prior art of record that address the Applicant's emphasized limitations.

The standing rejections rely on Bergano for the limitation of "actively monitors Q by adjusting a decision level threshold provided by the microprocessor" (p. 304-305, section III, adjustment of decision level in Fig. 1).

The standing rejections rely on Juniper and Waschka, Jr. to show the limitation of "a single bit error rate test source" (Juniper, the single BERT on p. 8; Waschka, Jr., BER test unit 22 in Fig. 2). The standing rejections rely on Hoogerbrugge to show the limitation of "simultaneously" testing (p. 977, col. 1, 2nd to last paragraph).

The standing rejections rely on Waschka, Jr. to show the limitation of the "bit error rate test signal ("BER test sequence" in col. 19, l. 20-21) operable to test N communication channels (links between stations in Fig. 1) from a single bit error rate test source (BER test unit 22 in Fig. 2) in conjunction with the performance monitors (BER circuitry in each station, col. 19, l. 30-33) and the diagnostic analyzer (alarm units in Figs. 10-11).

The standing rejections rely on an obviousness argument based on "the basic technique of decentralizing a singular process from one location to multiple locations" to address the limitation of "the bit error rate test signal is operable to test the N optical communication channels from the single bit error rate test source in conjunction with the performance monitor in ***each*** of the optical transmitters and ***each*** of the optical receivers and the diagnostic analyzer" (emphasis Examiner's) and the limitation of "the plurality of transmitter diagnostic output signals and the plurality of receiver diagnostic output signals ***each*** are generated by ***each*** performance monitor" (emphasis Examiner's).

Accordingly, Applicant's arguments are not persuasive, and Examiner respectfully maintains the standing rejections.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David S. Kim whose telephone number is 571-272-3033. The examiner can normally be reached on Mon.-Fri. 9 AM to 5 PM (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth N. Vanderpuye can be reached on 571-272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DSK

KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER